Alternative Energy

Edited by

A.K.M. Mohiuddin

Asif Hoda

IIUM Press

Published by:
IIUM Press
International Islamic University Malaysia

First Edition, 2011

Perpustakaan Negara Malaysia Cataloguing-in-Publication Data

A.K.M. Mohiuddin and Asif Hoda
Alternative Energy
A.K.M. Mohiuddin and Asif Hoda
Include index
Bibliography: p.

ISBN 978-967-418-158-1

Member of Majlis Penerbitan Ilmiah Malaysia – MAPIM
(Malaysian Scholarly Publishing Council)

Printed by :
IIUM PRINTING SDN. BHD.
No. 1, Jalan Industri Batu Caves 1/3
Taman Perindustrian Batu Caves
Batu Caves Centre Point
68100 Batu Caves
Selangor Darul Ehsan

Table of Contents

Chapter 28

Modelling of electronics heat sink – Influence of the wake function generation on the accuracy of CFD analysis

M. I. Ahmed, A. F. Ismail, Y. A. Abakr

Department of Mechanical Engineering, International Islamic University, Malaysia

Abstract

Cooling of electronic components continues to attract many research & development activities towards achieving an effective way of cooling. On this work, an analytic analysis of the cooling process was conducted to calculate the required cooling rate. A Fluent CFD model was developed to model and simulate the system. Experimental results were then used to test and evaluate the conditions at which the software results are approaching the exact measured values. A relation was discovered between the thermal wake function and capability of the software to give better estimations of the circuit board temperatures. The obtained results generally showed good agreement between the simulation and the experimental results.

Keywords: CFD, electronic cooling, heat sink, simulation.

INTRODUCTION

The present decade of electronics industry encountered appearance of many mobile electronic devices, which is accompanied by the progressive decrease of electronics device sizes. Also the higher processing rates resulted in an increasing rate of heat generation per unit surface area. Cooling requirements increased dramatically to secure device performance. According to statistics. Failure occurrence of electronic equipment increases according to the increase of device working temperature. On the other hand high thermal stresses in solder joints on circuit boards are major causes of failure. Therefore, cooling of electronics components has become increasingly important in the design and operation of electronic equipment. Many techniques are used for cooling the electronic circuits, but air-cooled forced convection cooling remained to be the most used technique.

The need of cooling of electronic components was known since Thomas Edison discovered the vacuum diode in 1883. The new era of electronics was started in 1958 by the invention of the silicon integrated circuit (IC). Integrated circuits contain several components such as diodes, transistors, resistors, and capacitors in a single chip. The number of components per chip has been increasing steadily. Electronic